US006435084B1

(12) **United States Patent**
Suzuki

(10) **Patent No.: US 6,435,084 B1**
(45) **Date of Patent: Aug. 20, 2002**

(54) **ROTARY TYPE STENCIL PRINTING MACHINE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2 days.

(21) Appl. No.: **09/716,409**

(22) Filed: **Nov. 21, 2000**

(30) **Foreign Application Priority Data**

Nov. 26, 1999 (JP) 11-336339
Oct. 13, 2000 (JP) 2000-313820

(51) **Int. Cl.**[7] **B41L 13/04**
(52) **U.S. Cl.** **101/118**; 271/273
(58) **Field of Search** 101/116, 117, 101/118, 410; 400/636.1; 271/273, 274

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(74) *Attorney, Agent, or Firm*—Kanesaka & Takeuchi

(57) **ABSTRACT**

To adjust positions of pinch rollers without rotating a press drum, in a nonprinting state, the pinch rollers are lifted to upper positions at which the pinch rollers are not brought into contact with the press drum by pivoting arms and cams, and the pinch rollers are moved along a shaft in conformity with width of a print sheet to thereby adjust a clearance therebetween. In starting a printing operation, since the pinch rollers are not brought into contact with the press drum and the width can immediately be adjusted, it is not necessary to move a recess portion of the press drum to location of the pinch rollers by rotating the press drum, therefore a first print time is shortened.

6 Claims, 16 Drawing Sheets

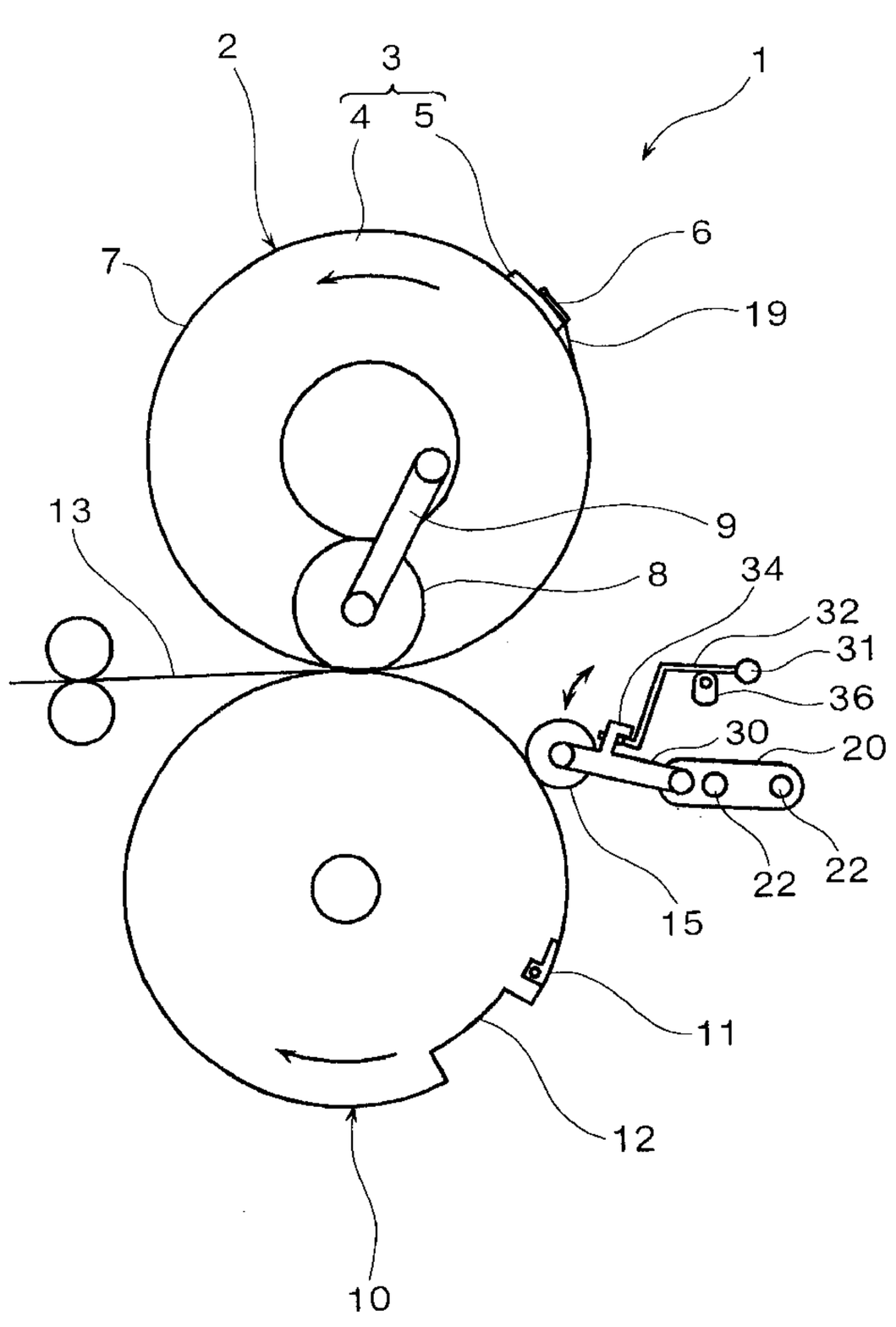
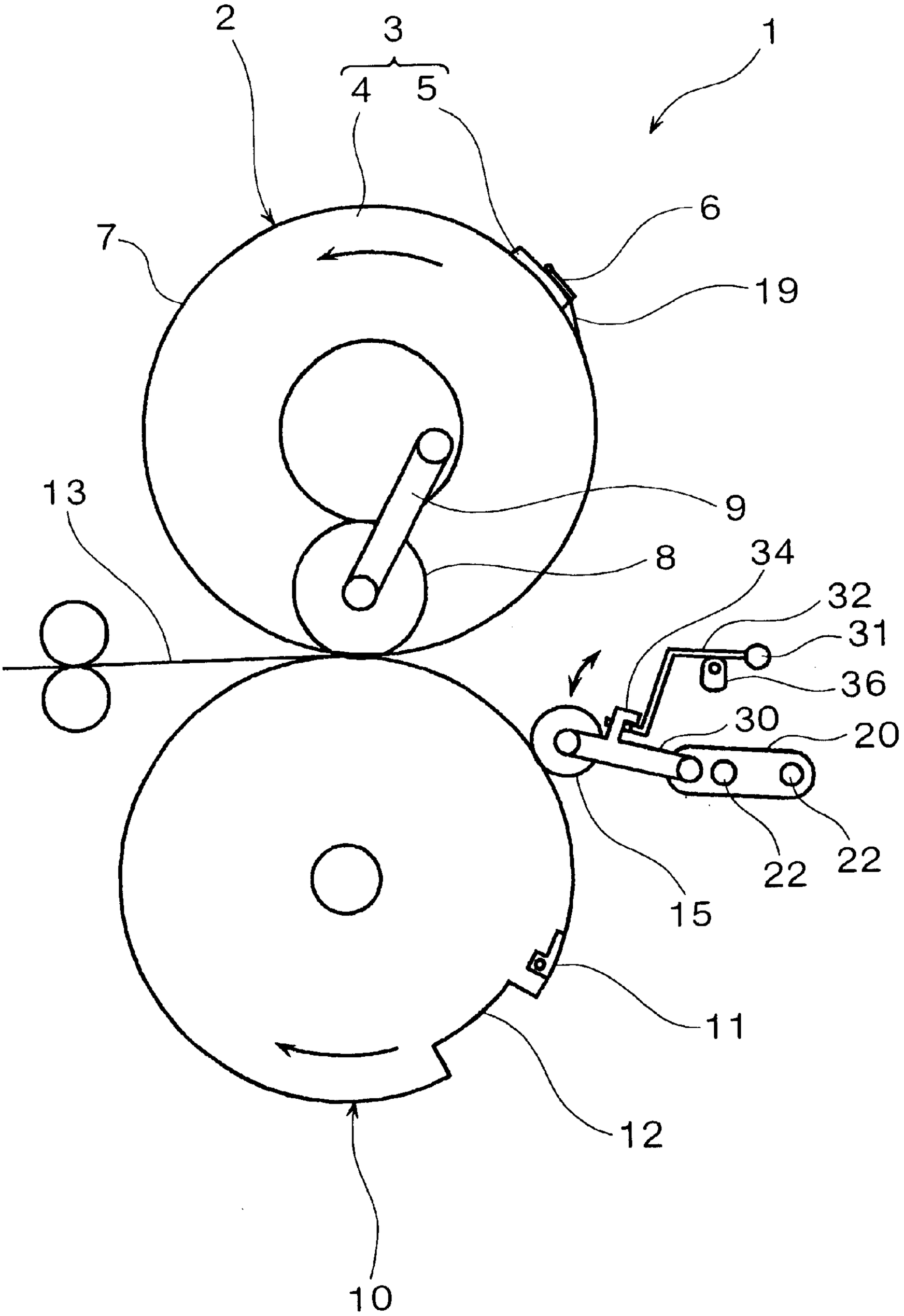


FIG. 1



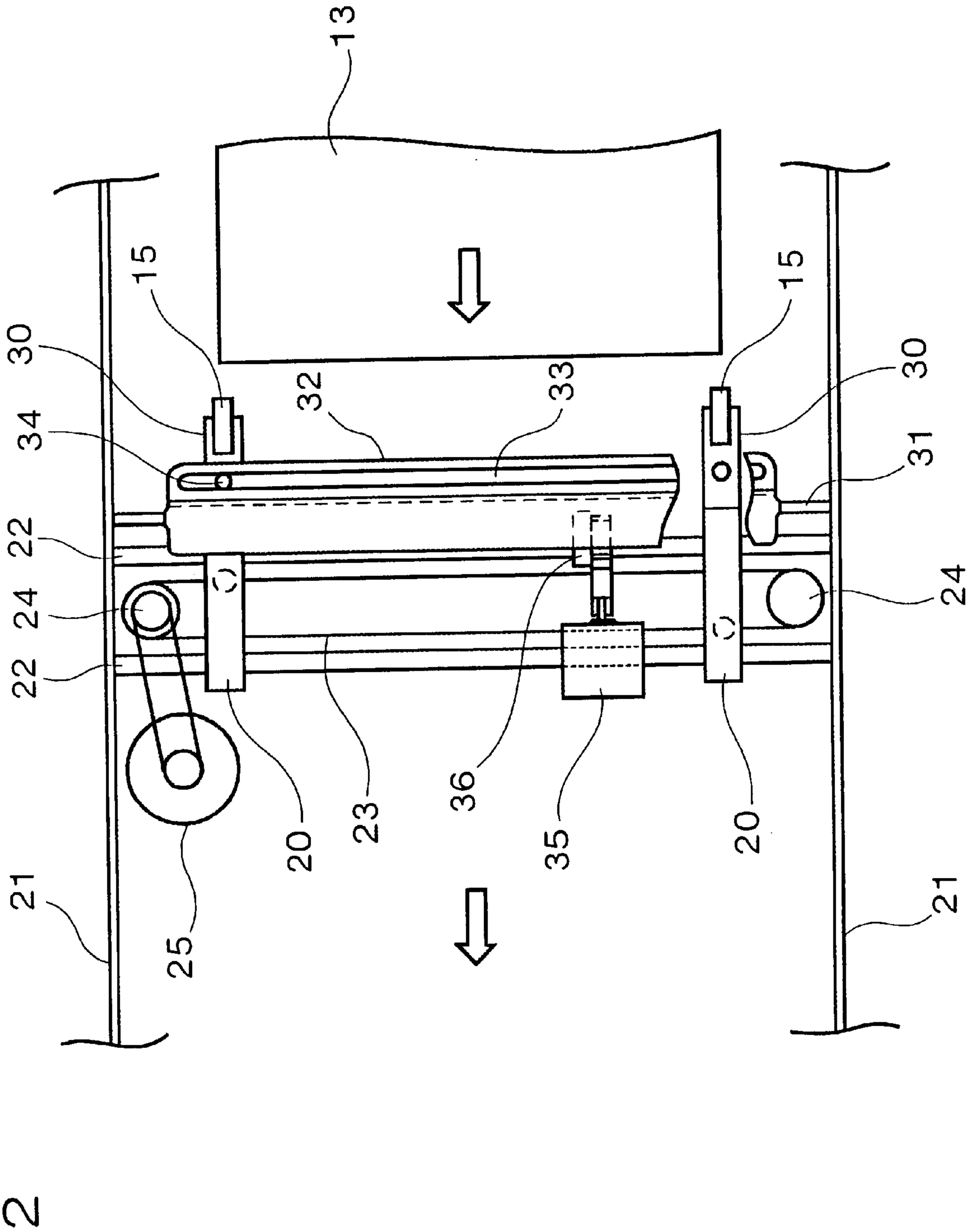


FIG. 2

FIG. 3

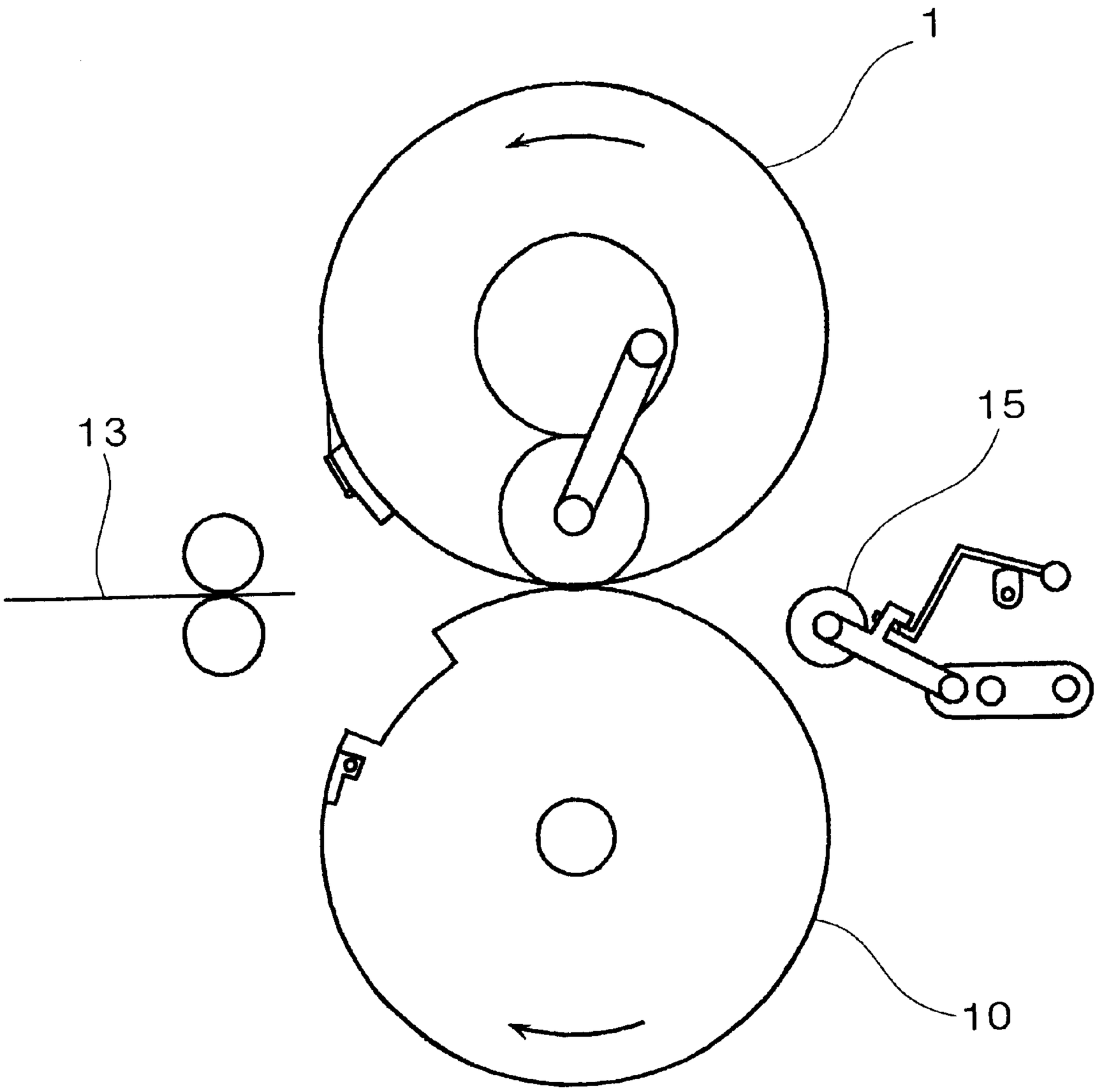


FIG. 4

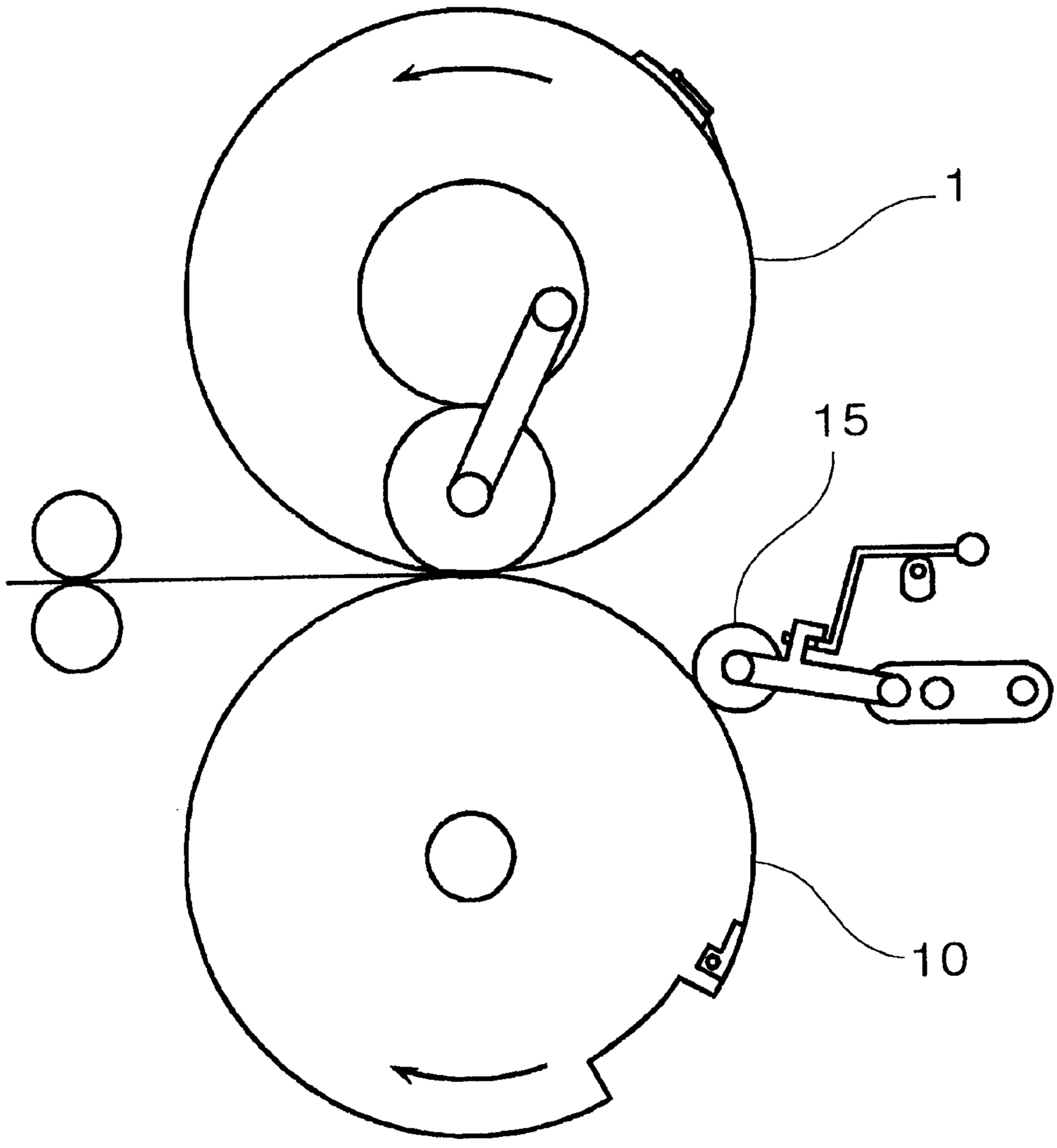


FIG. 5

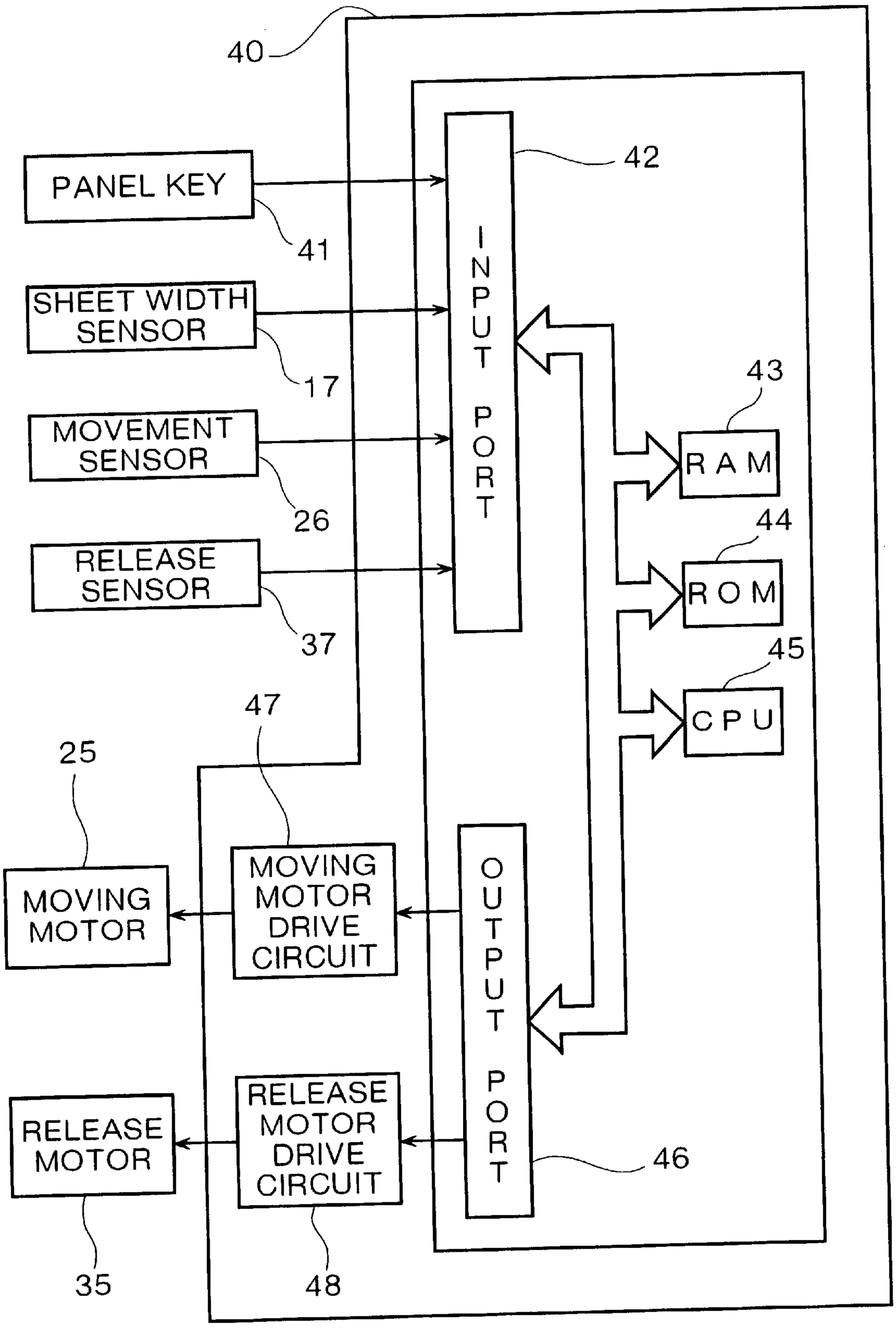

40
42
PANEL KEY
41
SHEET WIDTH SENSOR
17
MOVEMENT SENSOR
26
RELEASE SENSOR
37
INPUT PORT
43
RAM
44
ROM
45
CPU
47
25
MOVING MOTOR
MOVING MOTOR DRIVE CIRCUIT
OUTPUT PORT
46
RELEASE MOTOR
RELEASE MOTOR DRIVE CIRCUIT
35
48

FIG. 6

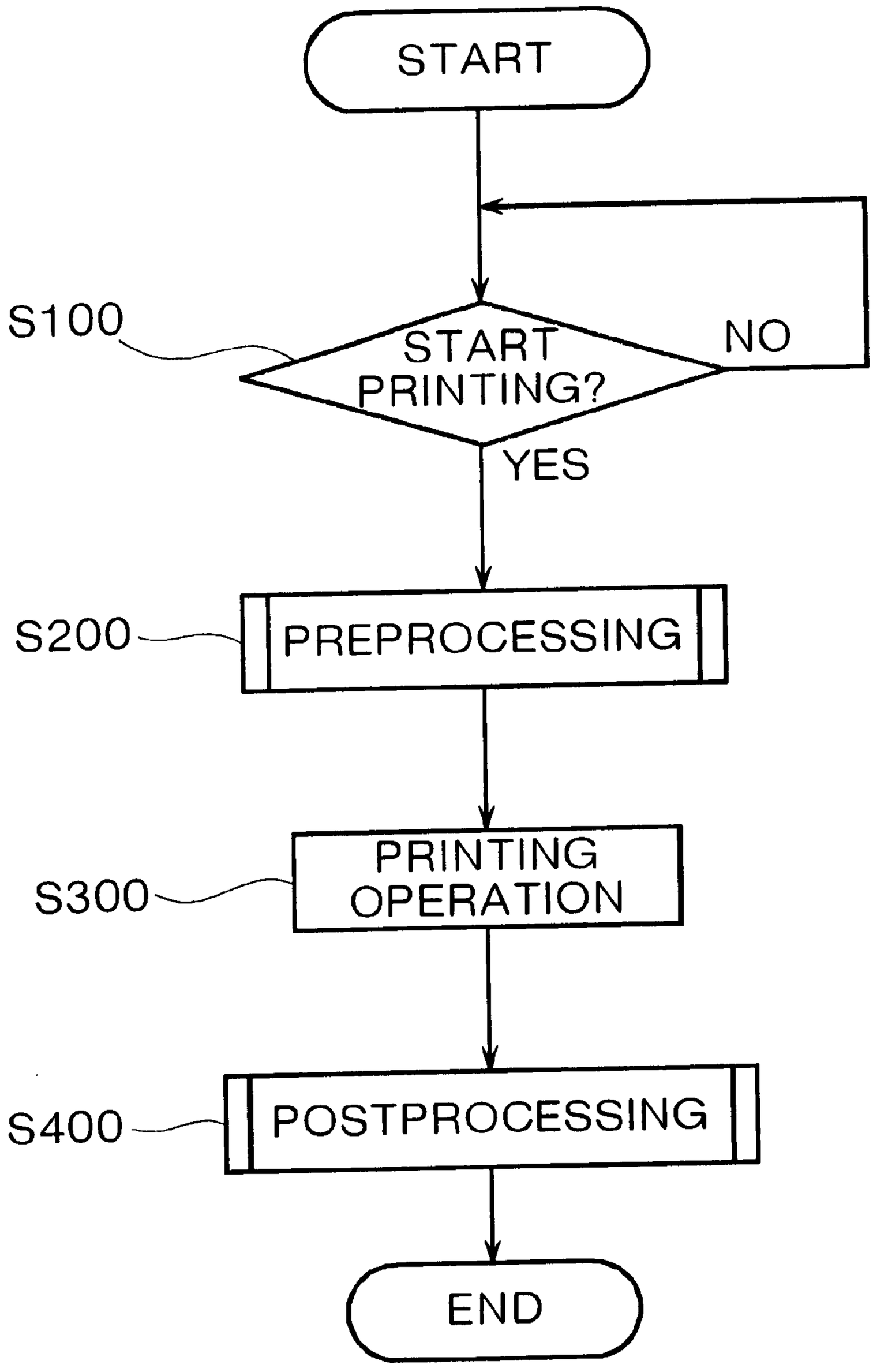

START
S100
START PRINTING?
NO
YES
S200
PREPROCESSING
S300
PRINTING OPERATION
S400
POSTPROCESSING
END

FIG. 7

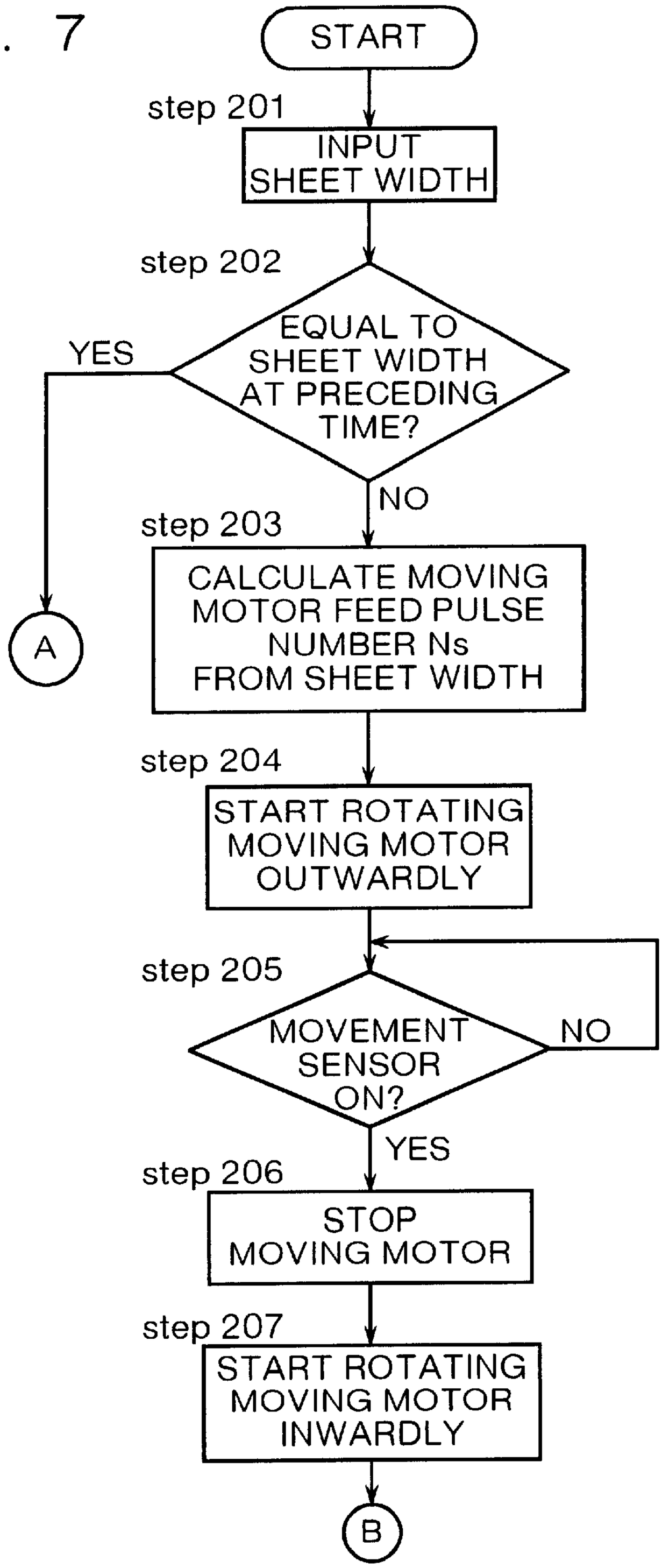

START
step 201
INPUT SHEET WIDTH
step 202
EQUAL TO SHEET WIDTH AT PRECEDING TIME?
YES
NO
A
step 203
CALCULATE MOVING MOTOR FEED PULSE NUMBER Ns FROM SHEET WIDTH
step 204
START ROTATING MOVING MOTOR OUTWARDLY
step 205
MOVEMENT SENSOR ON?
NO
YES
step 206
STOP MOVING MOTOR
step 207
START ROTATING MOVING MOTOR INWARDLY
B

FIG. 8

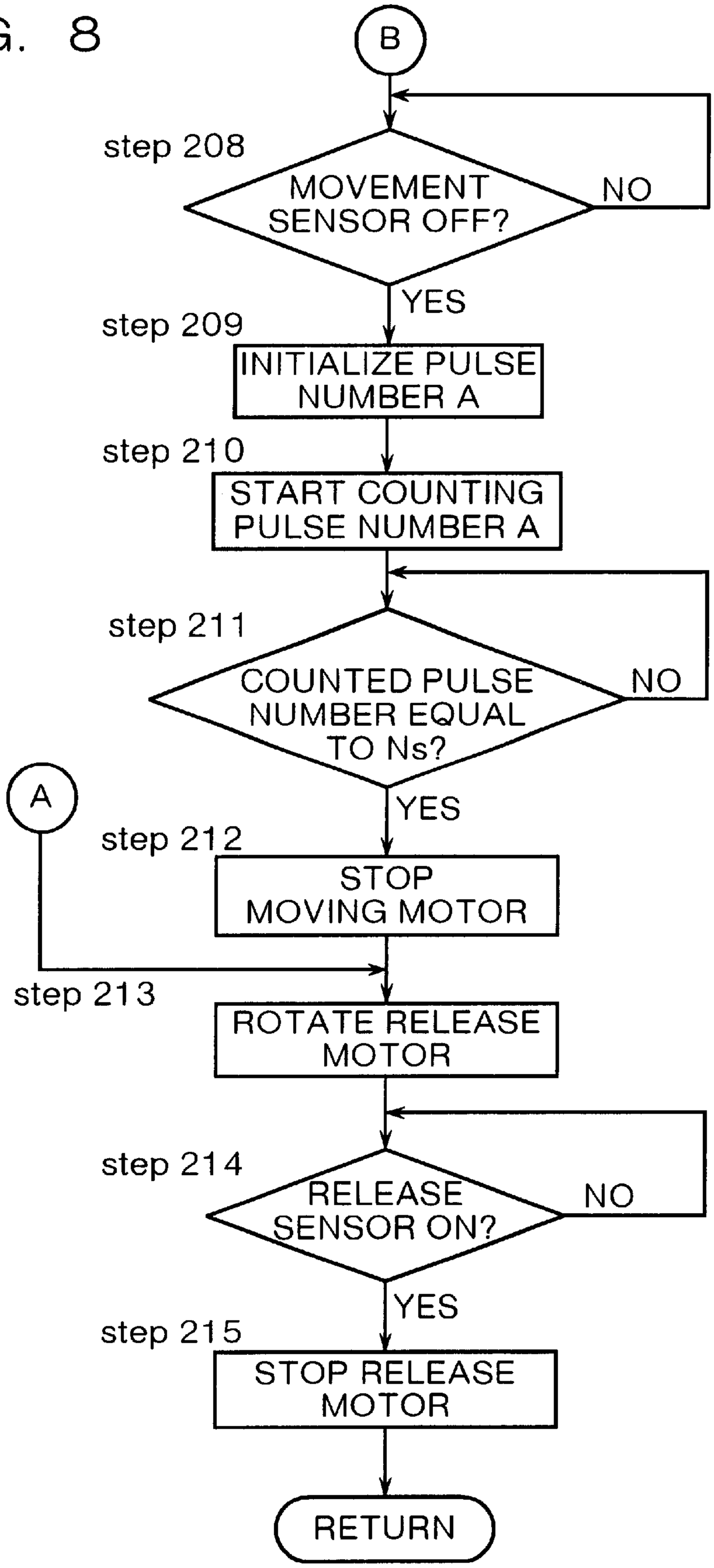

B
step 208
MOVEMENT SENSOR OFF?
NO
YES
step 209
INITIALIZE PULSE NUMBER A
step 210
START COUNTING PULSE NUMBER A
step 211
COUNTED PULSE NUMBER EQUAL TO Ns?
NO
YES
A
step 212
STOP MOVING MOTOR
step 213
ROTATE RELEASE MOTOR
step 214
RELEASE SENSOR ON?
NO
YES
step 215
STOP RELEASE MOTOR
RETURN

FIG. 9

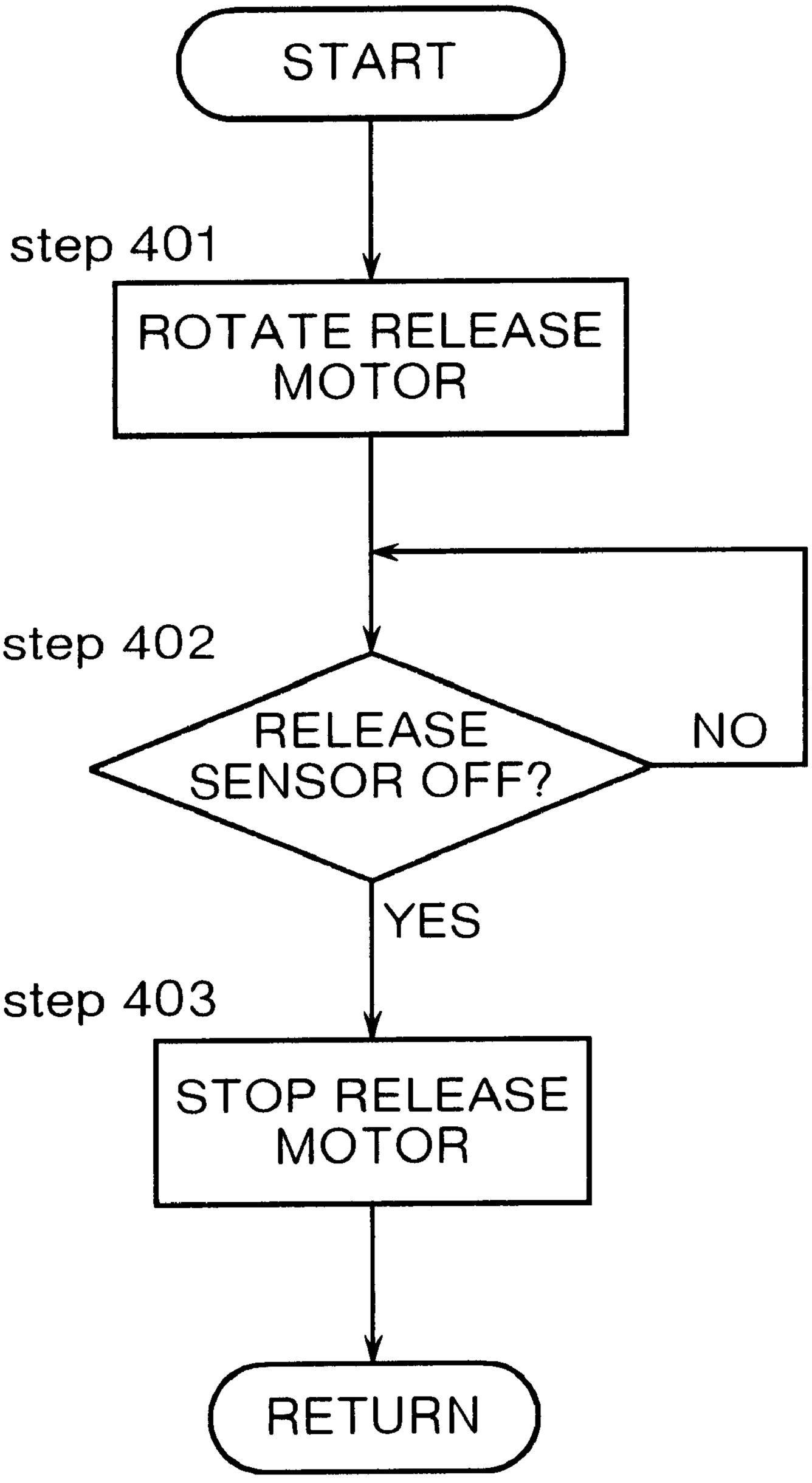

START
step 401
ROTATE RELEASE MOTOR
step 402
RELEASE SENSOR OFF?
NO
YES
step 403
STOP RELEASE MOTOR
RETURN

FIG. 10

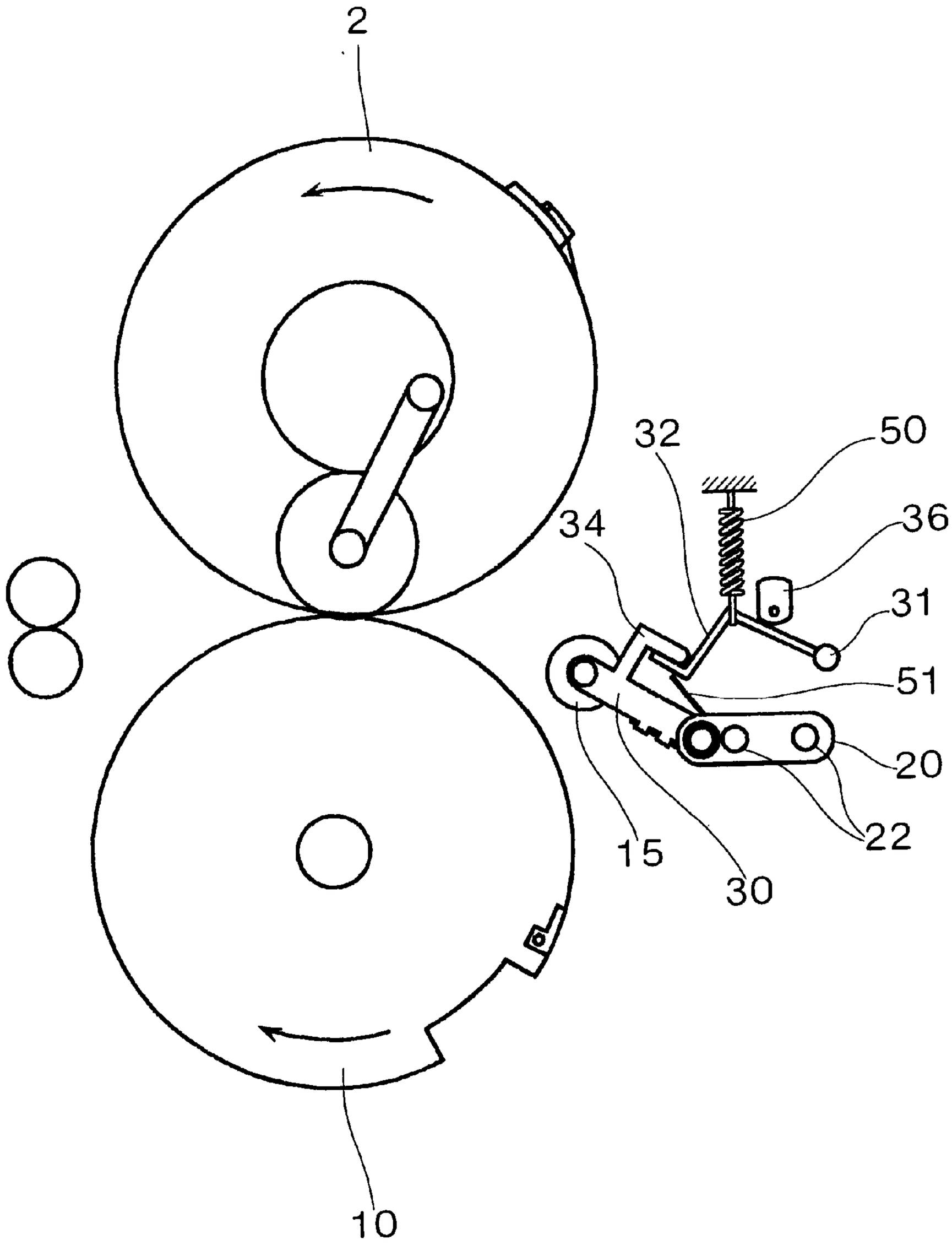


FIG. 11

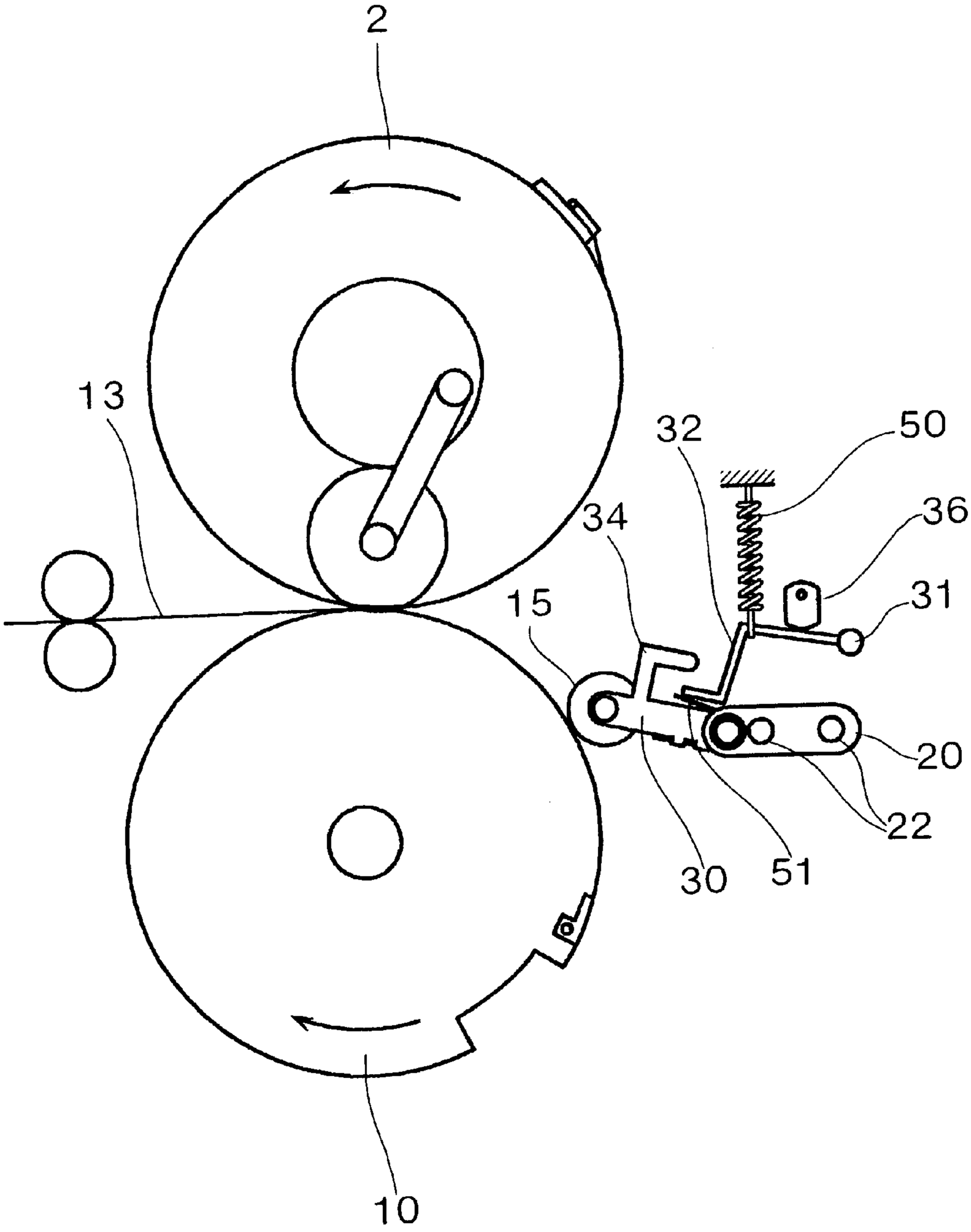


FIG. 12

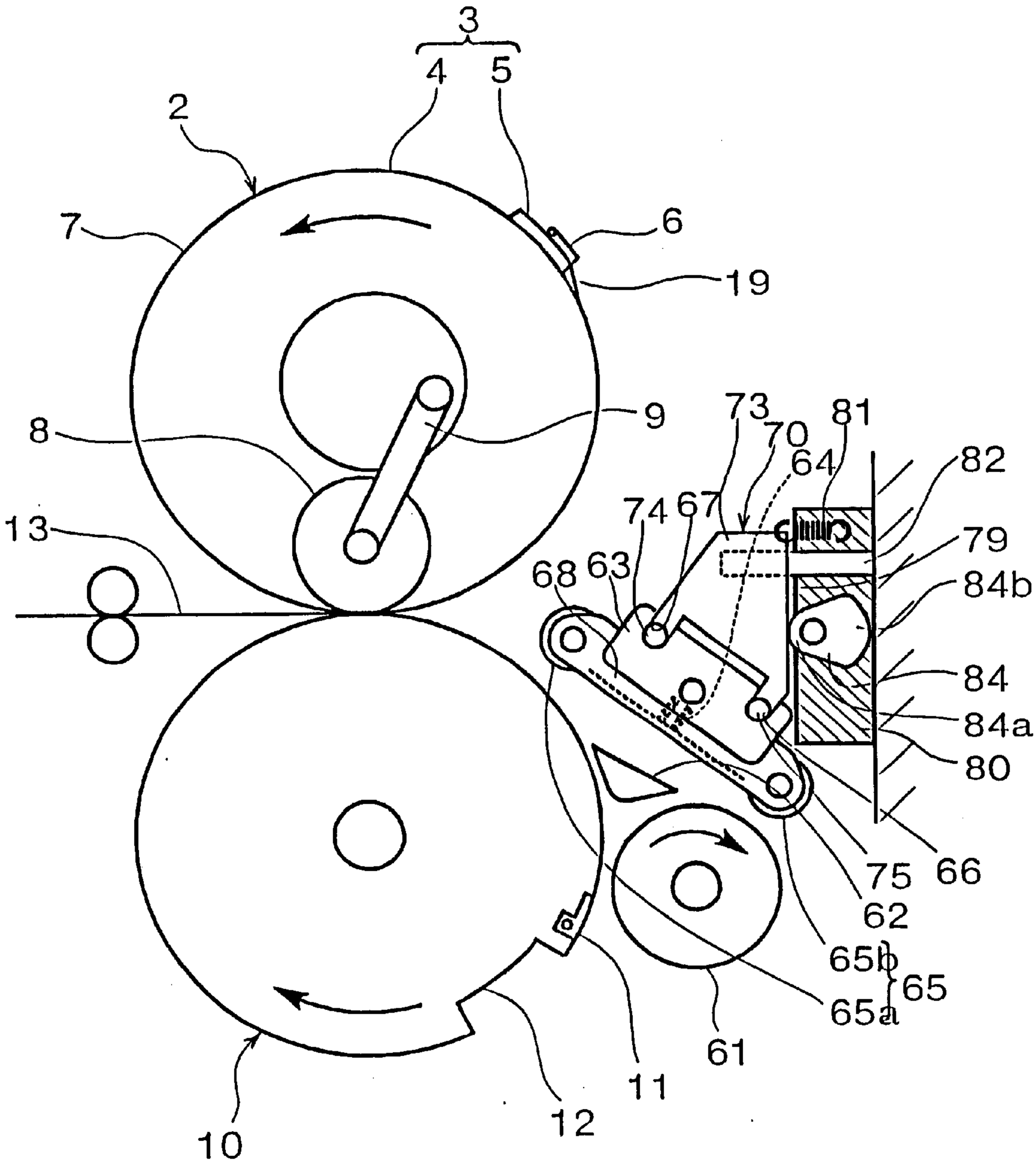
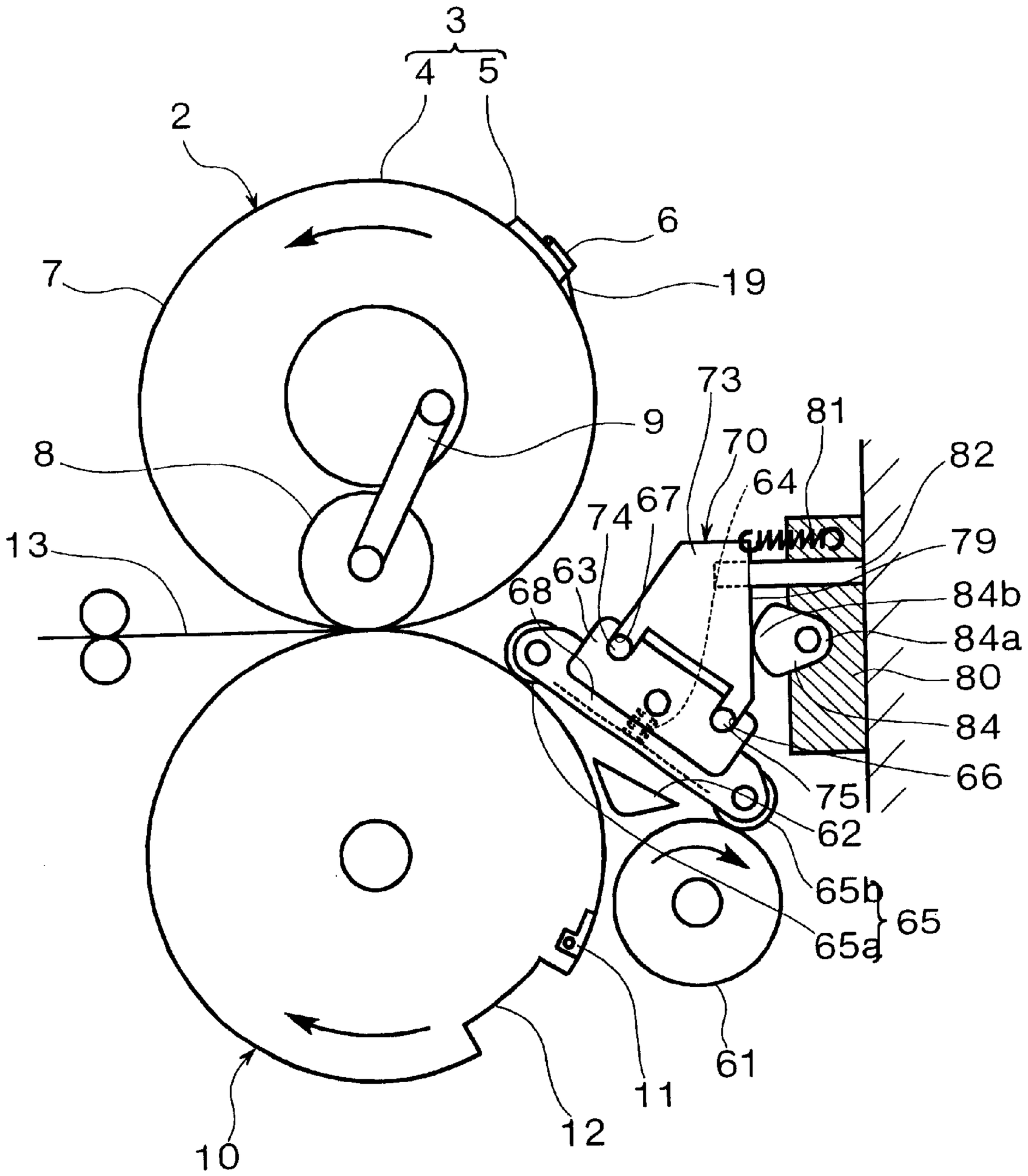

3
4
5
2
7
6
19
8
9
73
70
81
64
82
74
67
79
13
68
63
84b
84
84a
80
75
66
62
65b
65
65a
61
11
12
10

FIG. 13


3
4
5
2
6
19
7
9
8
73
81
70
64
82
74
67
79
13
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84b
84a
80
84
66
75
62
65b
65
65a
61
11
12
10

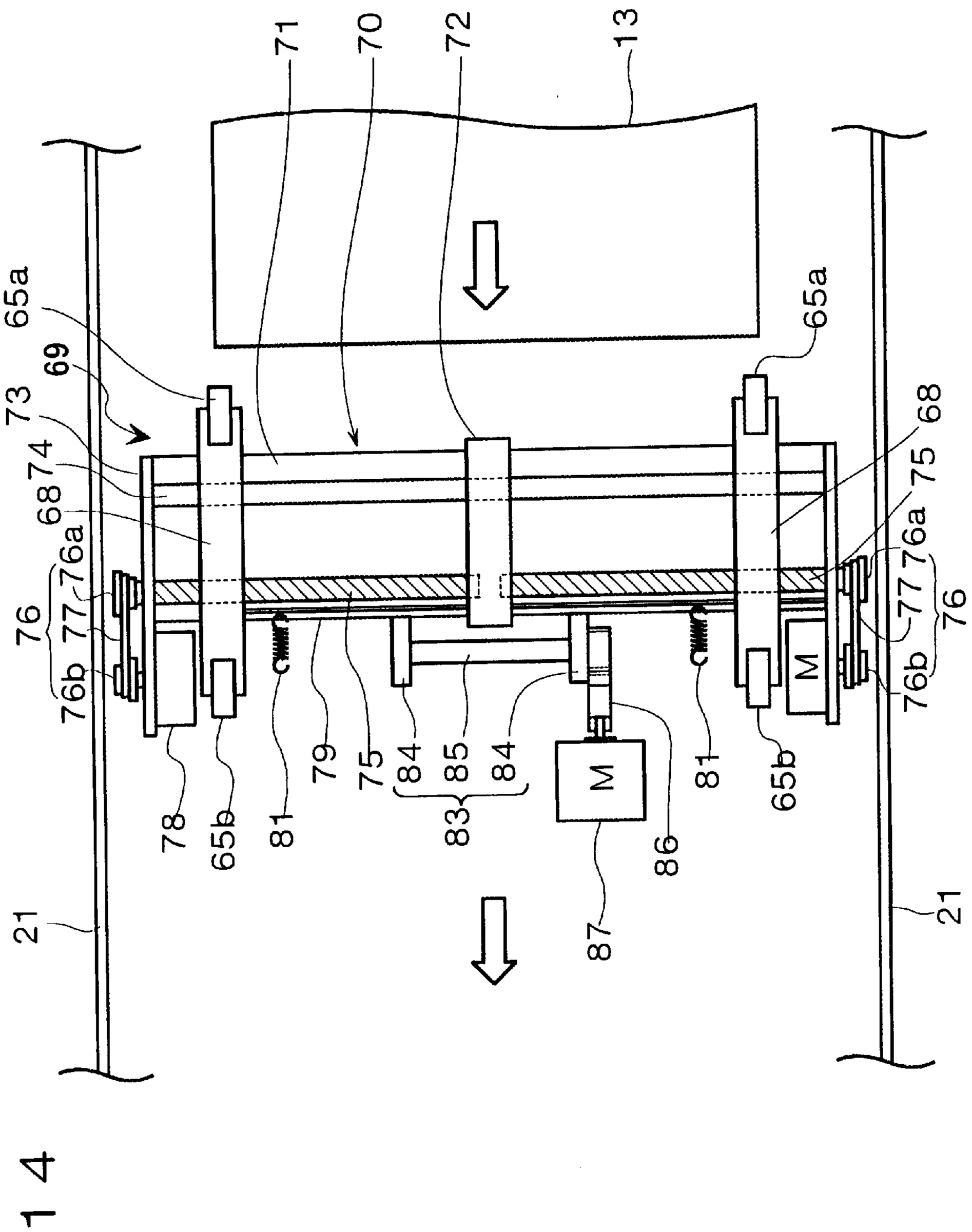

71
70
72
13
65a
69
73
74
68
76a
76
77
76b
78
65b
81
79
75
84
85
83
M
87
86
65a
68
75
76a
77
76
76b
65b
81
21
21

FIG. 14

FIG. 15 **Prior Art**

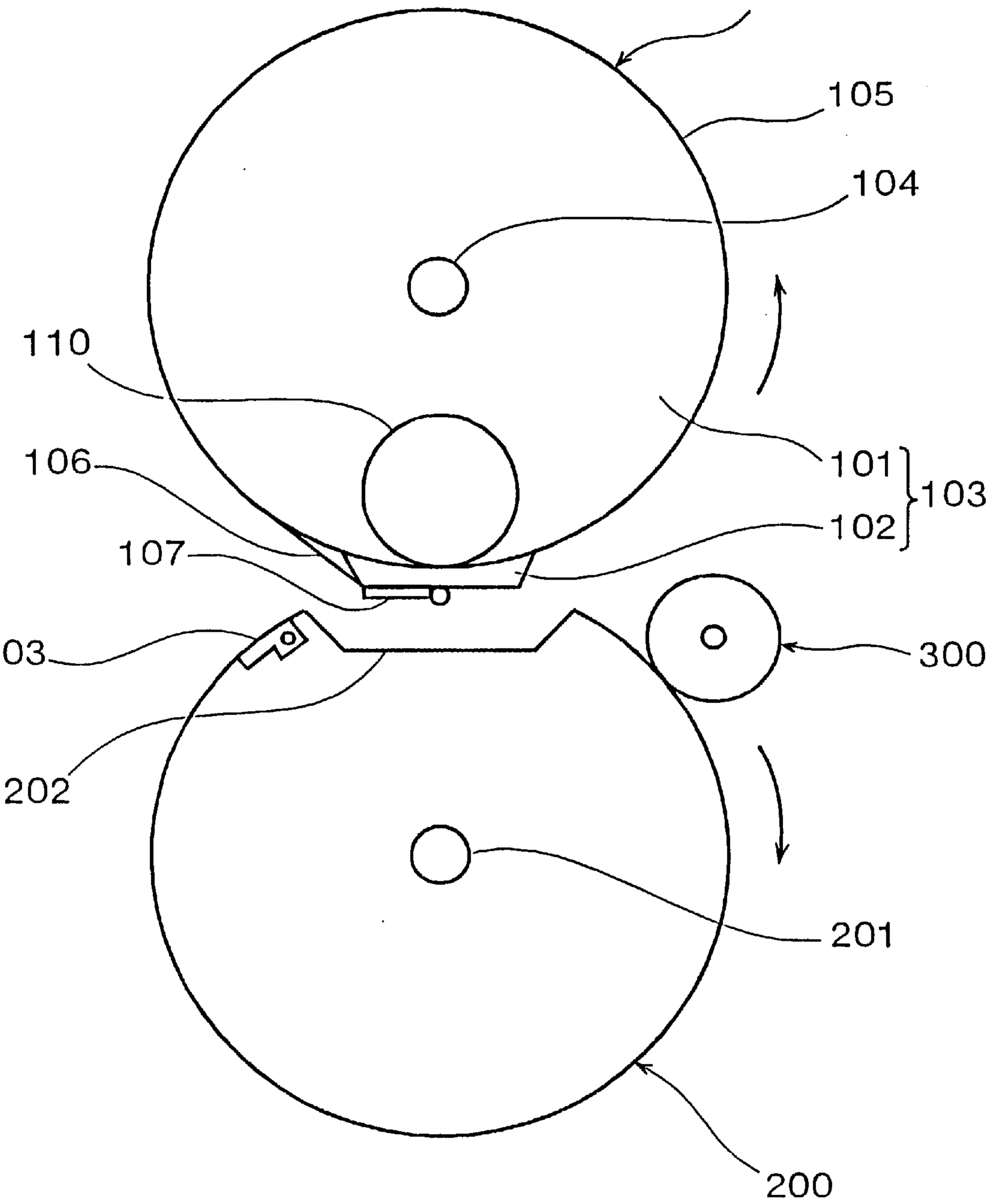
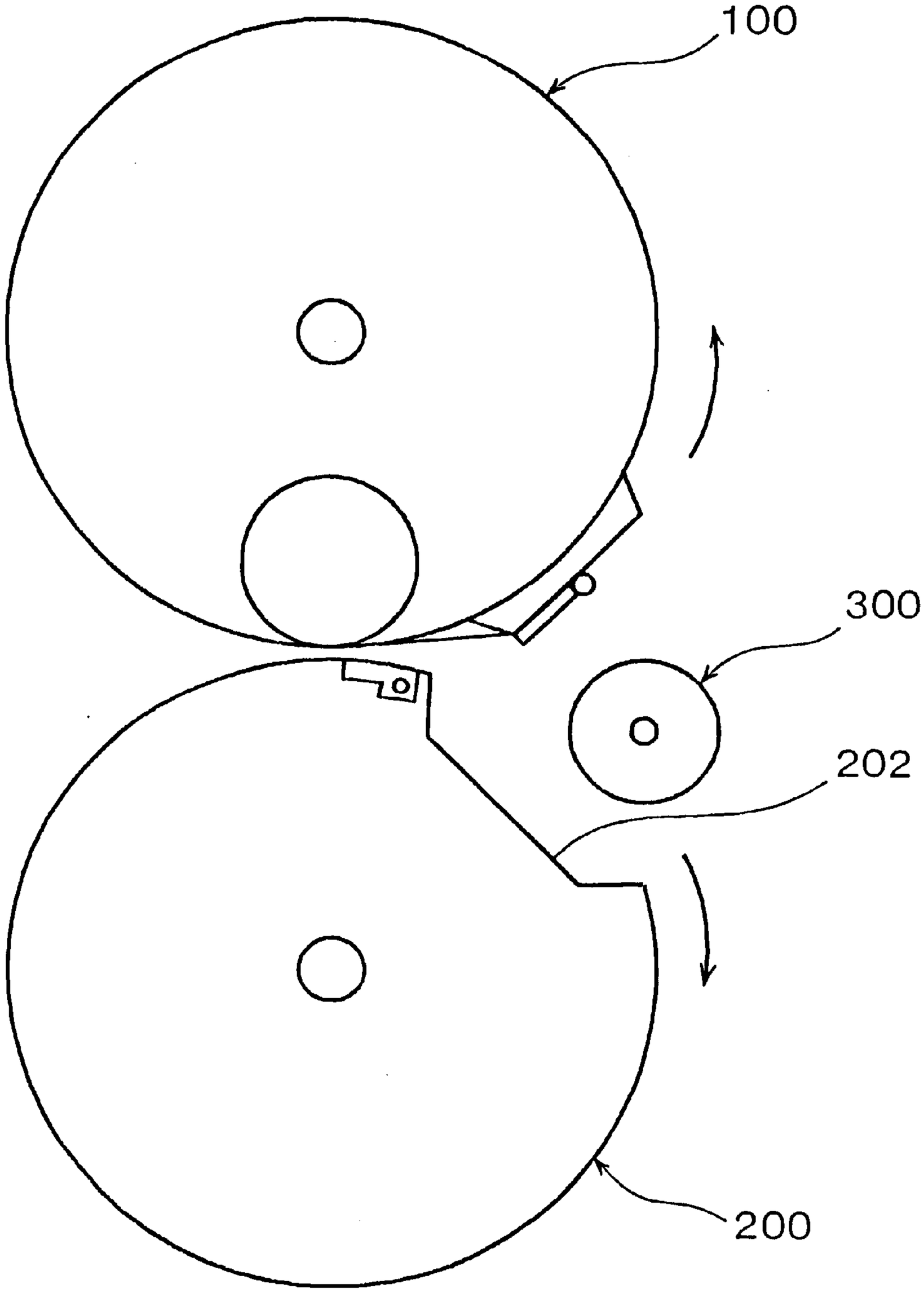


FIG. 16 Prior Art



ROTARY TYPE STENCIL PRINTING MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a rotary type stencil printing machine. According to the rotary type stencil printing machine of the present invention, a print sheet is printed while being carried by being sandwiched between a printing drum and a back press roller. Further, the print sheet is carried while being pressed to the back press roller by a pinch roller after having been peeled off from the printing drum.

2. Description of the Related Art

FIG. **15** is a sectional view showing an example of a basic structure of a conventional rotary type stencil printing machine.

The stencil printing machine is provided with a printing drum **100**. The printing drum **100** is provided with a base member **103** comprising a pair of circular plate members **101** arranged coaxially on a common central axis line **104** and a stencil clamping base **102** for connecting the pair of circular plate members **101**. The base member **103** is fixed with a gear, not illustrated, coaxially with the central axis line **104**. The gear is in mesh with a drive gear, not illustrated. By rotation of the drive gear, the base member **103** is driven to rotate centering on the central axis line **104**.

A screen member **105** which is ink-permeable and flexible, is made to wrap on the base member **103**. One end portion of the screen member **105** is fixed to the stencil clamping base **102** of the base member **103**. The screen member **105** is made to wrap on outer peripheral surfaces of the circular plate members **101**. Other end portion of the screen member **105** is elastically attached to the stencil clamping base **102** via a spring, not illustrated. Therefore, the screen member **105** is elastically deformed outwardly when depressed from an inner side thereof. The stencil clamping base **102** is provided with clamping means **107**. Perforated stencil sheet **106** is fixed to the stencil clamping base **102** at a front side thereof by the clamping means **107** and is made to wrap on an outer circumferential surface of the screen member **105**.

At an inner portion of the printing drum **100**, a squeegee roller **110** is vertically movably provided. The squeegee roller **110** is lifted and lowered at a predetermined timing in synchronism with rotation of the printing drum **100** and presses the screen member **105** outwardly. Ink supplying means, not illustrated, supplies a constant amount of ink onto a peripheral face of the squeegee roller **110**.

On a lower side of the printing drum **100**, a press drum **200** which is a back press roller is arranged. A diameter of the press drum **200** is substantially the same as that of the printing drum **100**. A rotational axis line **201** of the press drum **200** and the central axis line **104** of the printing drum **100** are in parallel with each other. In a nonprinting state, a very small clearance is provided between the printing drum **100** and the press drum **200**. The press drum **200** is driven to rotate in a direction reverse to that of the printing drum **100** in synchronism with rotation of the printing drum **100**.

A recess portion **202** is formed at an outer circumferential surface of the press drum **200**. When the printing drum **100** and the press drum **200** are rotated in synchronism with each other, the recess portion **202** corresponds to the clamping means **107** of the printing drum **100**. Therefore, even when a clearance between the printing drum **100** and the press drum **200** is very small, the clamping means **107** does not collide with the press drum **200**.

A clamp **203** is provided at proximity of the recess portion **202** of the press drum **200**. The clamp **203** holds a front end of print sheet supplied between the printing drum **100** and the press drum **200**. The print sheet is held by the clamp **203**, thereafter, sandwiched between the press drum **200** and printing drum **100** in accordance with rotation of the press drum **200** and is fed forwardly.

At proximity of the press drum **200**, a pinch roller **300** is rotatably provided. The pinch roller **300** is arranged side by side on a sheet discharge side of the press drum **200**. The pinch roller **300** presses the print sheet immediately after having been printed to the press drum **200** and peels off the print sheet from the printing drum **100**. Two pieces of the pinch rollers **300** are brought into contact with two edge portions in the width direction of the print sheet. A clearance between the two pieces of pinch rollers **300** in the axial direction can be adjusted in accordance with a width of the print sheet.

The print sheet is supplied between the printing drum **100** and the press drum **200**. The squeegee roller **110** is lowered and presses the screen member **105** outwardly at the predetermined timing. The screen member **105** and stencil sheet **106** which are deformed outwardly, sandwich the print sheet between the press drum **200** and the screen member **105** and stencil sheet **106**. The print sheet is carried while being sandwiched between the deformed printing drum **100** and the press drum **200**. While the print sheet is being carried, ink supplied to an inner circumferential face of the screen member **105**, passes through the screen member **105** and stencil sheet **106**, is transcribed onto the print sheet and forms an image.

When the stencil printing machine is brought into a standby state, the printing drum **100** and the press drum **200** are brought into a positional relationship shown by FIG. **15**. That is, the clamping means **107** of the printing drum **100** and the recess portion **202** of the press drum **200** coincide with each other. Therefore, the pinch roller **300** is brought into contact with the outer circumferential surface of the press drum **200**. Under the state, the two pieces of pinch rollers **300** can not be moved in the axial direction in accordance with the width of the print sheet. In order to move the pinch rollers **300** in the axial direction, it is necessary to rotate the press drum **200** to a pinch roller moving position shown in FIG. **16** and coincide the recess portion **202** of the press drum **200** with the pinch rollers **300** to thereby enable to move the pinch rollers **300** without resistance.

As has been explained above, according to the conventional stencil printing machine, a time period for moving the press drum **200** is needed for adjusting positions of the pinch rollers **300**. The time period for moving the press drum **200** is added to first print time and start up time for printing. The first print time indicates a time period from when a print button is depressed until a sheet of printed matter is discharged. It is generally recognized that the shorter the time period the higher the function of the printing machine and shortening of the first print time has been desired.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a rotary type stencil printing machine having short first print time since positions of pinch rollers can be adjusted without rotating a press drum.

According to a first aspect of the present invention, there is provided a rotary type stencil printing machine compris-

ing a printing drum (**2**) on which a perforated stencil sheet is made to wrap and which is rotated, a press drum (**10**) arranged at a vicinity of the printing drum and rotated in a direction reverse to a direction of the printing drum, pinch rollers (**15**) rotatably provided at a vicinity of the press drum for pressing a print sheet to the press drum such that the print sheet, which has been sandwiched between the printing drum and the press drum and printed, is held and carried by the press drum, pinch roller position adjusting means for adjusting positions of the pinch rollers in an axis line direction such that the pinch rollers can be brought into contact with predetermined positions of the print sheet, pinch roller releasing means for moving the pinch rollers between pinch positions at which the pinch rollers are brought into contact with the press drum and release positions at which the pinch rollers are separated from the press drum and controlling means (**40**) for controlling the pinch roller position adjusting means and the pinch roller releasing means such that the positions of the pinch rollers in the axis line direction can be adjusted only when the pinch rollers are set to the positions separated from the press drum.

According to a second aspect of the present invention, there is provided the rotary type stencil printing machine according to the first aspect, further comprising a sheet width sensor (**17**) for detecting a width of the supplied print sheet, wherein the pinch rollers (**15**) are two pieces of pinch rollers for pressing two edge portions of the print sheet in a width direction to the press drum, the pinch roller position adjusting means comprising a pair of moving members (**20**) made movable in the width direction of the print sheet and attached with the pinch rollers, moving means (belt **23**) for moving the pair of moving members in directions reverse to each other and a movement detecting sensor (movement sensor **26**) for detecting positions of the moving members, the pinch roller releasing means comprising attaching means (arms **30**) for attaching the pinch rollers pivotably to the moving members, driving means (release motor **35**) for setting the pinch rollers to the release positions or the pinch positions by pivotably moving the pinch rollers relative to the moving members and a release detecting sensor (release sensor **37**) for detecting whether the pinch rollers are brought into a release state and the controlling means (**40**) sets the pinch rollers to the release positions by operating the driving means of the pinch roller releasing means after finishing a printing operation and controls the pinch roller position adjusting means in accordance with a signal from the sheet width sensor before carrying out the printing operation.

According to a third aspect of the present invention, there is provided the rotary type stencil printing machine according to the second aspect, wherein the pinch roller releasing means further comprises cams (release cams **36**), which are connected to the driving means and pivoting, and an operating plate (**32**), which is provided to be brought into contact with the cams and pivoted by pivoting the cams and one end portion of which is engaged with the attaching means, and the pinch rollers are moved by the driving means, the cams, the operating plate and the attaching means.

According to a fourth aspect of the present invention, there is provided the rotary type stencil printing machine according to the second aspect, wherein the pinch roller releasing means further comprises cams (release cams **36**), which are connected to the driving means and pivoting, an operating plate (**32**), which is provided to be brought into contact with the cams and pivoted by pivoting the cams and one end portion of which is engaged with the attaching means (arms **30**), returning means (spring **50**) for urging the operating plate in a release direction and an elastic member (torsional coil spring **51**) having one end portion locked to the attaching means and the other end portion pressed by the operating plate moved in a pinch direction reverse to the release direction. According to the constitution, when the cams move the operating plate in the pinch direction against the returning means, the operating plate moves the attaching means in the pinch direction via the elastic member and sets the pinch rollers to the pinch positions. Further, when the cams permit the operating plate to move in the release direction by the returning means, the operating plate moves the attaching means in the release direction and sets the pinch rollers at the release positions.

According to a fifth aspect of the present invention, there is provided a rotary type stencil printing machine comprising, a printing drum (**2**) on which perforated stencil sheet is made to wrap and which is rotated, a press drum (**10**) arranged at a vicinity of the printing drum and rotated in a direction reverse to a direction of the printing drum, a paper discharge roll (**61**) arranged at a vicinity of the press drum and rotated in a direction the same as a direction of the press drum, pinch roller pairs (**65**) provided respectively rotatably at vicinities of the press drum and the paper discharge roll for pressing print sheet to the press drum and the paper discharge roll such that the print sheet which has been sandwiched between the printing drum and the press drum and printed is held and carried by the press drum and the paper discharge roll, pinch roller position adjusting means for adjusting positions of the pinch roller pairs in an axis line direction such that the pinch roller pairs can be brought into contact with predetermined positions of the print sheet, pinch roller releasing means for moving the pinch roller pairs between pinch positions at which the pinch roller pairs are brought into contact with the press drum and the paper discharge roll and release positions at which the pinch roller pairs are separated from the press drum and the paper discharge roll and controlling means (**40**) for controlling the pinch roller position adjusting means and the pinch roller releasing means such that the positions of the pinch rollers in the axis line direction are adjusted only when the pinch roller pairs are set to the positions separated from the press drum and the paper discharge roll.

According to a sixth aspect of the present invention, there is provided the rotary type stencil printing machine according to the fifth aspect, further comprising a sheet width sensor (**17**) for detecting a width of the supplied print sheet, wherein the pinch roller pairs (**65**) are two sets of pinch roller pairs for pressing two edge portions of the print sheet in a width direction to the press drum, the pinch roller position adjusting means comprising a pair of moving members (**68**) made movable in the width direction of the print sheet and respectively attached with the two sets of pinch roller pairs, moving means (**69**) for moving the pair of moving members in directions reverse to each other and a movement detecting sensor (**26**) for detecting positions of the moving members, the pinch roller releasing means comprising driving means (**87**) for setting the pinch roller pairs to the release positions or the pinch positions, cams (**83**) driven to rotate by the driving means, an operating member (**70**) provided to be brought into contact with the cams, pivoted by pivoting the cams and provided with the pair of moving members via the moving means and a release detecting sensor (**37**) for detecting whether the pinch roller pairs are brought into a release state and wherein the controlling means (**40**) sets the pinch roller pairs to the release positions by operating the driving means of the pinch roller releasing means after finishing a printing operation

and controls the pinch roller position adjusting means in accordance with a signal from the sheet width sensor before carrying out the printing operation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a sectional view showing a first example of an embodiment according to the present invention;

FIG. **2** is a plane view showing a vicinity of pinch rollers according to the first example;

FIG. **3** is a sectional view showing a nonprinting state in the first example of the embodiment according to the present invention;

FIG. **4** is a sectional view showing a printing state in the first example of the embodiment according to the present invention;

FIG. **5** is a block diagram of controlling means in the first example of the embodiment according to the present invention;

FIG. **6** is a flow chart showing control operation in the first example of the embodiment according to the present invention;

FIG. **7** is a flow chart showing the control operation in the first example of the embodiment according to the present invention;

FIG. **8** is a flow chart showing the control operation in the first example of the embodiment according to the present invention;

FIG. **9** is a flow chart showing the control operation in the first example of the embodiment according to the present invention;

FIG. **10** is a sectional view showing a nonprinting state in a second example of the embodiment according to the present invention;

FIG. **11** is a sectional view showing a printing state in the second example of the embodiment according to the present invention;

FIG. **12** is a sectional view showing a nonprinting state in a third example of an embodiment according to the present invention;

FIG. **13** is a sectional view showing a printing state in the third example of the embodiment according to the present invention;

FIG. **14** is a plane view showing a vicinity of pinch rollers in the third example;

FIG. **15** is a sectional view showing a basic structure of a conventional stencil printing machine; and

FIG. **16** is a sectional view showing the basic structure of the conventional stencil printing machine.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An explanation will be given of a rotary type stencil printing machine **1** which is an example of an embodiment according to the present invention in reference to FIG. **1** through FIG. **9** as follows. In this example, an explanation will be given mainly of printing means comprising a printing drum and a press drum. Paper feeding means, paper discharging means, stencil perforating means, stencil discharging means, draft reading means and the like provided to the stencil printing machine of the example, are the same as those in a conventional machine shown in FIG. **15** and FIG. **16** and therefore, an explanation thereof will be omitted.

A printing drum **2** is provided with a base member **3**. The base member **3** is provided with a pair of circular plate members **4** arranged coaxially on a common central axis line and a stencil clamping base **5** as a base element for connecting the pair of circular plate members **4**. A longitudinal direction of the stencil clamping base **5** is in parallel with the central axis line of the circular plate members **4**. The base member **3** is driven to rotate centering on the central axis line.

The stencil clamping base **5** is provided with clamping means **6** for holding a front end of stencil sheet.

One end portion of the stencil clamping base **5** is attached with one end portion of a screen member **7**. The one end portion of the screen member **7** is disposed on the upstream side in the rotational direction of the printing drum **2**. At least one portion of the screen member **7** is ink-permeable and is made of a flexible material. The screen member **7** is made to wrap on the base member **3** to be directed to the downstream side in the rotational direction such that a pair of side edge portions thereof are brought into sliding contact with peripheral faces of the pair of circular plate members **4**. Other end portion of the screen member **7** is attached to other end portion of the stencil clamping base **5** via a spring. In this way, the screen member **7** is pulled to the downstream side in the rotational direction by elastic force of the spring and is made to wrap on the peripheral faces of the pair of circular plate members **4**. Therefore, the screen member **7** constitutes a cylindrical shape as a whole. When the screen member **7** is pressed from an inner side thereof, the screen member **7** is bulged outwardly while sliding on the peripheral faces of the circular plate members **4** and returns to the original state by the spring when the press force is removed.

A squeegee roller **8** is provided at an inner portion of the printing drum **2**. The squeegee roller **8** is provided to a pivoting member **9** and is vertically movable at the inner portion of the printing drum **2**. The squeegee roller **8** is driven to rotate in a direction the same as the direction of the printing drum **2** in cooperation with the printing drum **2**. Further, the squeegee roller **8** presses the screen member **7** outwardly by a predetermined timing in synchronism with rotation of the printing drum **2**. Ink supplying means, not illustrated, supplies ink to the squeegee roller **8**.

A press drum **10** is arranged on the lower side of the printing drum **2**. A diameter of the press drum **10** is substantially the same as a diameter of the printing drum **2**. In a nonprinting state, there is provided a very small clearance between the printing drum **2** and the press drum **10**. The press drum **10** is driven to rotate in a direction reverse to that of the printing drum **2** in synchronism with rotation of the printing drum **2**. A hold claw **11** for holding a front end of print sheet is provided openably and closably at an outer circumferential surface of the press drum **10**. The outer circumferential surface of the press drum **10** is provided with a recess portion **12** for avoiding interference with the clamping means **6** of the printing drum.

Pinch rollers **15** are rotatably provided at a vicinity of the press drum **10**. The pinch rollers **15** are arranged side by side on a sheet discharge side of the press drum **10**. The pinch rollers **15** press print sheet immediately after having been printed to the press drum **10** and peel off the print sheet from the printing drum **2**. Two pieces of the pinch rollers **15** are brought into contact with two edge portions in the width direction of print sheet **13**.

Further, the rotary type stencil printing machine **1** of the example is provided with a sheet width sensor for detecting the width of the print sheet **13** supplied.

The two pieces of pinch rollers **15** are brought into contact with predetermined positions disposed at two end edges in

the width direction of the print sheet **13**. The predetermined positions are determined by the width of the print sheet **13**. According to the example, there is provided pinch roller position adjusting means for adjusting positions of the pinch rollers **15** in an axis line direction thereof such that the pinch rollers **15** can be brought into contact with the predetermined positions of the print sheet **13** having various dimensions. Further, there is provided pinch roller releasing means for moving the pinch rollers **15** to release positions separated from the press drum **10**. Further, there is provided controlling means for carrying out a control such that the pinch roller position adjusting means is operated only when the pinch rollers **15** are set to the release positions. That is, according to the example, the pinch rollers **15** are separated from the press drum **10** in a nonprinting state and the positions of the pinch rollers **15** in the axis line direction are adjusted in conformity with the size of the print sheet at the separated positions.

An explanation will be given of structures of the pinch rollers **15**, the pinch roller position adjusting means and the pinch roller releasing means in reference to FIG. **1** and FIG. **2**. In this example, there are provided two pieces of the pinch rollers **15** and the two pieces of pinch rollers **15** press the two edge portions of the print sheet in the width direction to the press drum **10**.

The pinch roller position adjusting means is provided with a pair of moving members **20** which are made movable in the width direction of the print sheet **13**. The pinch rollers **15** are moved along with the moving members **20**. The moving members **20** are slidable relative to two pieces of shafts **22** which are attached to side plates **21** of the machine. A belt **23** which is moving means is made to hang around a pair of pulleys **24**. One of the pulleys **24** is driven by a moving motor **25**. The pair of moving members **20** are fixed to sides of the belt **23** opposed to each other. Therefore, the pair of moving members **20** are moved in directions opposed to each other along the shafts **22** when the moving motor **25** is driven. That is, the pair of moving members **20** are moved in directions separating from each other or moved in directions approaching each other.

Further, the pinch roller position adjusting means is provided with a movement detecting sensor for detecting the positions of the moving members **20**.

The pinch roller releasing means is provided with arms **30** pivotably attached to the moving members **20**. The pinch rollers **15** are pivotably attached to front ends of the arms **30**. The arms **30** are pivoted between pinch positions where the pinch rollers **15** are brought into contact with the press drum **10** and release positions where the pinch rollers **15** are separated from the press drum **10**.

First, there is provided an operating plate **32** for pivoting around a shaft **31** in parallel with the shafts **22** between the side plates **21** of the machine. The operating plate **32** is formed with a groove **33** along the longitudinal direction and the groove **33** is movably engaged with engaging portions **34** of the arms **30**. The pinch roller releasing means is provided with a release motor **35** and a release cam **36** pivoted by the release motor **35** as driving means. The release cam **36** is brought into contact with a lower face of the operating plate **32**. When the release motor **35** rotates the release cam **36**, the operating plate **32** is pivoted centering on the shaft **31**. When the operating plate **32** is pivoted, two pieces of the arms **30** engaged with the operating plate **32** are pivoted along therewith and accordingly, two pieces of the pinch rollers **15** are also pivoted. FIG. **3** shows a state in which the pinch roller **15** is separated from the press drum **10**. FIG. **4** shows a state in which the pinch roller **15** is brought into contact with the press drum **10** by its own weight.

Further, the pinch roller releasing means is provided with a release detecting sensor for detecting whether the pinch rollers **15** are brought into a release state.

The stencil printing machine according to the example is provided with controlling means **40**. Although the controlling means **40** controls a total of the machine, in FIG. **5**, there is shown only a portion thereof related to control of the pinch rollers **15**. The controlling means **40** receives an input from a panel key **41** of the machine, a signal from a sheet width sensor **17**, a signal from a movement sensor **26** and a signal from a release sensor **37** from an input port **42**. Based on programs and data stored to RAM **43** and ROM **44**, CPU **45** processes information of these and outputs a control signal from an output port **46**. The outputted control signal is provided to a moving motor drive circuit **47** and drives the moving motor **25**, thereby, a clearance between two pieces of the pinch rollers **15** is set. The outputted control signal is provided to a release motor drive circuit **48** and drives the release motor **35**, thereby, two pieces of the pinch rollers **15** are lifted and set to the release positions.

The controlling means **40** sets the pinch rollers **15** to the release positions by operating the release motor **35** after the printing operation. Before the printing operation, the moving motor **25** is driven in accordance with the signal from the sheet width sensor **17** and the clearance in the axial direction between the pinch rollers **15** disposed at the release positions is adjusted.

As shown by FIG. **1**, the print sheet **13** is supplied between the printing drum **2** and the press drum **10**. The press drum **10** is rotated while holding the front end of the print sheet **13** by the hold claw **11** and the printing drum **2** is rotated in synchronism with the press drum **10**. The squeegee roller **8** is lowered at the predetermined timing and presses the screen member **7** outwardly. The screen member **7** and the stencil sheet **19** which are deformed outwardly, sandwich the print sheet **13** between the press drum **10** and the screen member **7** as well as the stencil sheet **19**. The print sheet **13** is carried by being sandwiched between the deformed printing drum **2** and the press drum **10**. While carrying the print sheet **13**, ink supplied to the inner circumferential face of the screen member **7** is transcribed onto the print sheet **13** after passing through the screen member **7** and the stencil sheet **19** and forms an image.

The print sheet **13** coming out from between the printing drum **2** and the press drum **10** is pressed to the press drum **10** side by the pinch rollers **15**. Thereby, the print sheet **13** stuck to the print drum **2** side by the ink is peeled off by the pinch rollers **15**. After the print sheet **13** passes through the pinch rollers **15**, the hold claw **11** is released and the print sheet **13** is discharged onto a tray for discharging sheet, not illustrated.

An explanation will be given of the control of the pinch rollers **15** in the operation of the machine.

As shown by FIG. **6**, at step **100** (designated by S**100** in the drawing), it is determined whether the printing operation is started. Specifically, the controlling means **40** determines whether a print start button of the panel key **41** is depressed. Next, at step **200**, a preprocessing is carried out. Next, at step **300**, the printing operation is carried out. Next, at step **400**, a postprocessing is carried out and a series of processings is finished.

An explanation will be given of a procedure of the preprocessing indicated in step **200** in reference to FIG. **7** and FIG. **8**.

As shown by FIG. **7**, at step **201**, information of sheet width for print sheet **13** to be printed successively is inputted from the sheet width sensor **17**. At step **202**, it is determined whether the sheet width of the print sheet **13** is equal to a width of print sheet **13** which has been printed at a preceding time. When the widths are equal, it is not necessary to change the clearance between two pieces of the pinch rollers **15** and the procedure proceeds to 'A' of FIG. **8**. When the widths are not equal, at step **203**, an amount of driving the moving motor **25** necessary for moving the pinch rollers **15** from original point positions to positions in correspondence with a new sheet width is calculated as a number of motor feed pulses. The pulse number is designated by notation Ns. At step **204**, the moving motor **25** is driven and the pair of pinch rollers **15** are moved in directions separating from each other. At step **205**, it is determined whether the movement sensor **26** detects the moving members **20**. Detection of the moving members **20** by the movement sensor **26** signifies that the moving members **20** and the pinch rollers **15** return to the original point positions. At step **206**, the moving motor **25** is stopped. At step **207**, the number of motor feed pulses provided at step **203** is provided to the moving motor **25** to thereby start to drive the moving motor **25** and the pair of pinch rollers **15** start moving in directions approaching each other. Once the moving members **20** move away from the original point positions, the movement sensor **26** is made OFF.

As shown by FIG. **8**, at step **208**, when it is determined that the movement sensor **26** is made OFF, at step **209**, a number of pulses of a counter stored with a number of pulses for driving the moving motor **25** is initialized and at step **210**, counting of the number of pulses for driving the moving motor **25** is started. At step **211**, when it is determined that the counted number of pulses for driving the moving motor **25** reaches Ns, at step **212**, the moving motor **25** is stopped.

When the sheet width of the print sheet **13** is equal to that in the preceding time, that is, when determination at step **202** of FIG. **7** is YES, the operation proceeds to step **213** shown in FIG. **8**. That is, the operation of adjusting the clearance between the pinch rollers **15** becomes unnecessary and at step **213**, the release motor **35** is rotated. The pinch rollers **15** are lowered from the release positions and brought into contact with the press drum **10**. At step **214**, when the release sensor **37** is made ON and there is brought about a state in which the pinch rollers **15** are brought into contact with the press drum **10** and pressed, at step **215**, the release motor **35** is stopped.

Next, the printing operation is carried out at step **300** in FIG. **6**. After the printing operation, the postprocessing is carried out as shown by step **400** in FIG. **6**. An explanation will be given of the postprocessing in reference to FIG. **9**.

As shown by FIG. **9**, at step **401**, the release motor **35** is rotated and the pinch rollers **15** are lifted and are moved in a direction separating from the press drum **10**. At step **402**, when it is confirmed that the release sensor **37** is made OFF, at step **403**, the release motor **35** is stopped. According to the postprocessing step, the pinch rollers **15** are disposed always at positions escaped from the press drum **10**, that is, the release positions at other than the printing operation.

Next, an explanation will be given of other embodiment of a rotary type stencil printing machine according to the present invention in reference to FIG. **10** and FIG. **11**. An explanation will be given of points different from the first example. According to the example, the operating plate **32** is hung by a spring **50** as returning means. The release cam **36** is arranged on an upper side of the operating plate **32**. A torsional coil spring **51** as an elastic member is interposed between the moving member **20** and the arm **30**. An upper side end portion of the torsional coil spring **51** is pressed downwardly by the operating plate **32** which is lowering. A lower side end portion of the torsional coil spring **51** is locked by a lock piece formed at the arm **30**. By the torsional coil spring **51**, pressure for pressing the pinch rollers **15** to the press drum **10** is set.

When a projected portion of the release cam **36** is disposed on the upper side as shown by FIG. **10**, the operating plate **32** is pulled back upwardly by the spring **50**. The arm **30** provided with the pinch roller **15** is pulled up to an upper escaping position by the operating plate **32**. That is, the pinch roller **15** is separated from the press drum **10**.

When the release cam **36** is rotated and the projected portion is disposed on the lower side as shown by FIG. **11**, the release cam **36** pushes down the operating plate **32** by elongating the spring **50**. The pushed-down operating plate **32** pushes down the upper side end portion of the torsional coil spring **51**. The arm **30** receives downward force via the torsional coil spring **51**. The pinch roller **15** is pressed to the press drum **10** by the elastic force of the torsional coil spring **51**. That is, according to the example, pressure of pressing the press drum **10** by the pinch roller **15** is set to a predetermined value by the torsional coil spring **51**. Further, by changing the shape of the release cam, the pressure can be changed.

When the projected portion of the release cam escapes from the operating plate **32** as shown by FIG. **10**, the operating plate **32** moves upwardly by recovery force of the spring **50**, thereby, the arm **30** is lifted and the pinch roller **15** is separated from the press drum **10**.

According to the above-described embodiment, the pinch roller **15** is pulled up and is set to the release position where the pinch roller **15** is not brought into contact with the outer circumferential surface of the press drum **10** at other than the case in which the print sheet is passed between the printing drum **2** and the press drum **10**, that is, at other than the printing operation. Therefore, movement of the pinch roller **15** in the axial direction, that is, adjustment of the clearance can be carried out without rotating the press drum **10**. Further, deterioration of the pinch roller **15** can be retarded. Further, when jammed sheet is removed by removing the printing drum **2** from the main body, operation is facilitated since the pinch rollers **15** are pulled up.

Further, according to the above-described embodiment, by adjusting the shape of the release cam **36** or the position of the release cam **36** in the rotational direction, a state in which the pinch rollers **15** are brought into contact with the press drum **10** can be changed. That is, nip pressure by which the pinch rollers **15** hold the print sheet on the paper drum **10** can be adjusted. Therefore, in the case of soft print sheet which is easy to be impressed by a nip mark, there is facilitated adjustment of nip pressure in conformity with the sheet such as reducing the nip pressure.

According to the above-explained embodiments, movement of the pinch rollers **15** in the axial direction and movement thereof relative to the press drum **10** are carried out by the motors **25** and **35** and the cam **36**. Further, in transmitting the drive force, there are adopted the belt **23** and link mechanisms of the pivoting arms **30** and the like. However, selection of the driving means is arbitrary, a solenoid or the like can be used other than the motor and in transmitting the drive force, further various mechanisms can be adopted.

Next, an explanation will be given of other embodiment of a rotary type stencil printing machine according to the present invention in reference to FIG. **12** through FIG. **14**. An explanation will be given of only points different from the first example.

As shown by FIG. **12** and FIG. **13**, a discharge roll **61** is provided at a vicinity of the press drum **10** with a predetermined clearance therebetween. An axis line direction of the discharge roll **61** is the same as the axis line directions of the printing drum **2** and the press drum **10**. The discharge roll **61** is rotated in a direction the same as the rotational direction of the press drum **10**. A diameter of the discharge roll **61** is smaller than the diameter of the press drum **10**. A guide member **62** for guiding the printed print sheet **13** to the discharge roll **61** side is provided between the press drum **10** and discharge roll **61**.

According to the example, as pinch rollers, there are used two sets of pairs of pinch rollers **65***a* and **65***b* (pinch roller pairs **65**). Ones of the pinch roller pairs **65** (first pinch rollers **65***a*) are disposed at a vicinity of the outer circumferential surface of the press drum **10** and others (second pinch rollers **65***b*) thereof are disposed at a vicinity of an outer circumferential surface of the discharge roll **61**. The pinch roller pairs **65** are for pressing the outer circumferential surfaces of the press drum **10** and the discharge roll **61**.

Next, an explanation will be given of pinch roller position adjusting means. The pinch roller position adjusting means is provided with moving members **68**. The pinch roller pairs **65** are rotatably attached to both ends of the moving members **68**. The longitudinal directions of the moving members **68** are in parallel with a common tangential line of the press drum **10** and discharge roll **61**. Connecting plates **63** are attached to middle portions of the moving members **68**. The connecting plates **63** are formed with screw holes **66** and through holes **67** in the longitudinal directions. Further, as shown by FIG. **12** and FIG. **13**, the moving members **68** and connecting plates **63** are connected further by coil springs **64**. Thereby, the pinch roller pairs **65** can apply nip pressure for pressing the print sheet to the press drum **10** and the discharge roll **61**.

Next, an explanation will be given of moving means **69**. As shown by FIG. **14**, the moving means **69** is provided at an operating member **70**. The operating member **70** is formed substantially in a box-like shape directing an opening portion **71** thereof substantially downwardly. A supporting member **72** is provided at the center of the opening portion **71** in parallel with side plates **73** of the operating member **70**. Further, a shaft **74** is provided in the opening portion **71** in parallel with the axis line direction. The shaft **74** is inserted through the through holes **67** of the connecting plates **63**. Further, the shaft **74** penetrates the supporting member **72**.

Further, screw shafts **75** are axially supported respectively between the side plates **73** in the opening portion **71** and the supporting member **72**. One end of each of the screw shafts **75** is screwed to a screw hole (not illustrated) formed at the side plate **73** and is projected from the side plate **73**. Other ends of the respective screw shafts **75** are axially supported by the supporting member **72**. Two pieces of the screw shafts **75** are provided on a straight line along the axis line direction. Further, the respective screw shafts **75** are screwed to the screw holes **66** of the connecting plates **63**.

Further, pairs of pulleys **76** (**76***a*, **76***b*) are provided on outer sides of the respective side plates **73**. Belts **77** are hung around the pairs of pulleys **76**. The pulleys **76***a* on one side attached to the screw shaft **75** are projected from the side plates **73**. The pulleys **76***b* on other side are connected to moving motors **78** via the side plates **73**.

That is, when the moving motors **78** are driven at a predetermined timing, the pair of moving members **68** are moved in directions reverse to each other by being guided by the screw shaft **75** and the shaft **74**.

Next, an explanation will be given of pinch roller releasing means. The pinch roller releasing means is provided with the operating member **70**. As shown by FIG. **12** and FIG. **13**, a holding member **80** fixed to an inner portion of the main body of the machine is provided on a front face plate **79** side of the operation member **70**. The holding member **80** is provided with coil springs **81**, a support shaft **82** and a release cam **83**. A hook of one end of each of the coil springs **81** is hung to the holding member **80**. A hook of other end thereof is hung to an upper portion of the operating member **70**. An upper plate of the operating member **70** is provided with a wall thickness larger than those of the side plates **73** and the front face plate **79**. The support shaft **82** is inserted through the large wall thickness portion. The release cam **83** is axially supported pivotably by the holding member **80**.

Further, as shown by FIG. **14**, the release cam **83** is provided with a pair of cam portions **84**. A shaft **85** is provided in the axis line direction between the cam portions **84**. The shaft **85** is fixed to fixing ends **84***a* of the respective cam portions **84** and axially supports pivotably totals of the cam portions **84**. The cam portions **84** are provided with a release motor **87** as driving means via a power converting mechanism **86**. Further, although not illustrated, the operating member **70** is slidably supported by side plates of the main body.

Next, an explanation will be given of operation of the main body. As shown by FIG. **12**, when the pinch roller pairs **65** are set to release positions, the fixing ends **84***a* of the cam portions **84** are brought into contact with the front face plate **79** of the operating member **70**. When the release motor **87** is driven from the state, the release cams **84** are rotated by 180 degree. Further, as shown by FIG. **13**, projected pieces **84***b* of the cam portions **84** are brought into contact with the front face plate **79** of the operating member **70**. Thereby, the operating member **70** is slidably moved relative to the support shaft **82**. Further, the operating member **70** becomes remote from the holding member **80** and the coil springs **81** are pulled.

At this occasion, the first pinch rollers **65***a* press the outer circumferential surface of the press drum **10**. Further, at the same time, the second pinch rollers **65***b* press the outer circumferential surface of the discharge roll **61**. This state indicates the pinch position. Further, as shown by FIG. **13**, the print sheet **13** is supplied to between the printing drum **2** and the press drum **10**. The press drum **10** is rotated while the holding the front end of the print sheet **13** by the hold claw **11** and the printing drum **2** is rotated in synchronism with the press drum **10**. At the predetermined timing, the squeegee roller **8** is lowered and presses the screen member **7** outwardly. The screen member **7** and the stencil sheet **19**, which are deformed outwardly, sandwich the print sheet **13** between the press drum **10** and the screen member **7** as well as the stencil sheet **19**. The print sheet **13** is carried by being sandwiched between the deformed printing drum **2** and the press drum **10**. While the print sheet **13** is being carried, ink supplied to the inner circumferential face of the screen member **7** is transcribed onto the print sheet **13** after passing through the screen member **7** and the stencil sheet **19** to thereby form an image.

Therefore, operation and effect similar to those in the above-described embodiments can be achieved also in this example.

Further, in this example, the first pinch rollers **65***a* press the outer circumferential surface of the press drum **10**. At the same time, the second pinch rollers **65***b* press the outer circumferential surface of the discharge roll **61**. But, the second pinch rollers **65***b* may press the outer circumferential surface of the discharge roll **61** after the first pinch rollers **65***a* press the outer circumferential surface of the press drum **10**.

Further, control of the pinch roller pairs in operation of the example is the same as the control in the above-described embodiments and accordingly, an explanation thereof will be omitted.

According to the present invention, in a stencil printing machine having a printing drum, a press drum and pinch rollers, the pinch rollers are made movable to release positions separated from the press drum and adjustment of positions of the pinch rollers in the axial direction in correspondence with sheet width, is carried out when the pinch rollers are disposed at the release positions at other than printing operation.

Therefore, according to the present invention, the adjustment of the positions of the pinch rollers can be carried out without rotating the press drum and accordingly, there is achieved an effect in which the first print time is shortened.

What is claimed is:

1. A rotary type stencil printing machine comprising:

a printing drum on which perforated stencil sheet is made to wrap and which is rotated;

a press drum arranged at a vicinity of the printing drum and rotated in a direction reverse to a direction of the printing drum;

pinch rollers rotatably provided at a vicinity of the press drum for pressing a print sheet to the press drum such that the print sheet which has been sandwiched between the printing drum and the press drum and printed is held and carried by the press drum;

pinch roller position adjusting means for adjusting positions of the pinch rollers in an axis line direction such that the pinch rollers can be brought into contact with predetermined positions of the print sheet;

pinch roller releasing means for moving the pinch rollers between pinch positions at which the pinch rollers are brought into contact with the press drum and release positions at which the pinch rollers are separated from the press drum; and

controlling means for controlling the pinch roller position adjusting means and the pinch roller releasing means such that the positions of the pinch rollers in the axis line direction can be adjusted only when the pinch rollers are set to the positions separated from the press drum.

2. The rotary type stencil printing machine according to claim **1**, further comprising:

a sheet width sensor for detecting a width of the print sheet;

wherein the pinch rollers are two pieces of pinch rollers for pressing two edge portions of the print sheet in a width direction to the press drum;

wherein the pinch roller position adjusting means comprising:

a pair of moving members made movable in the width direction of the print sheet and attached with the pinch rollers;

moving means for moving the pair of moving members in directions reverse to each other; and

a movement detecting sensor for detecting positions of the moving members;

wherein the pinch roller releasing means comprising:

attaching means for attaching the pinch rollers pivotably to the moving members;

driving means for setting the pinch rollers to the release positions or the pinch positions by pivotably moving the pinch rollers relative to the moving members; and

a release detecting sensor for detecting whether the pinch rollers are brought into a release state; and

wherein the controlling means sets the pinch rollers to the release positions by operating the driving means of the pinch roller releasing means after finishing a printing operation and controls the pinch roller position adjusting means in accordance with a signal from the sheet width sensor before carrying out the printing operation.

3. The rotary type stencil printing machine according to claim **2**:

wherein the pinch roller releasing means further comprising:

cams which are connected to the driving means and pivoting: and

an operating plate which is provided to be brought into contact with the cams and pivoted by pivoting the cams and one end portion of which is engaged with the attaching means:

wherein the pinch rollers are moved by the driving means, the cams, the operating plate and the attaching means.

4. The rotary type stencil printing machine according to claim **2**:

wherein the pinch roller releasing means further comprising:

cams which are connected to the driving means and pivoting;

an operating plate which is provided to be brought into contact with the cams and pivoted by pivoting the cams and one end portion of which is engaged with the attaching means;

returning means for urging the operating plate in a release direction; and

an elastic member having one end portion locked to the attaching means and the other end portion pressed by the operating plate when the operating plate is moved in a pinch direction reverse to the release direction;

wherein when the cams move the operating plate in the pinch direction against the returning means, the operating plate moves the attaching means in the pinch direction via the elastic member and sets the pinch rollers to the pinch positions; and

wherein when the cams permit the operating plate to move in the release direction by the returning means, the operating plate moves the attaching means in the release direction and sets the pinch rollers at the release positions.

5. A rotary type stencil printing machine comprising:

a printing drum on which perforated stencil sheet is made to wrap and which is rotated;

a press drum arranged at a vicinity of the printing drum and rotated in a direction reverse to a direction of the printing drum;

a paper discharge roll arranged at a vicinity of the press drum and rotated in a direction the same as the direction of the press drum;

pinch roller pairs provided respectively rotatably at vicinities of the press drum and the paper discharge roll for pressing print sheet to the press drum and the paper discharge roll such that the print sheet which has been sandwiched between the printing drum and the press drum and printed is held and carried by the press drum and the paper discharge roll;

pinch roller position adjusting means for adjusting positions of the pinch roller pairs in an axis line direction such that the pinch roller pairs can be brought into contact with predetermined positions of the print sheet;

pinch roller releasing means for moving the pinch roller pairs between pinch positions at which the pinch roller pairs are brought into contact with the press drum and the paper discharge roll and release positions at which the pinch roller pairs are separated from the press drum and the paper discharge roll; and

controlling means for controlling the pinch roller position adjusting means and the pinch roller releasing means such that the positions of the pinch rollers in the axis line direction are adjusted only when the pinch roller pairs are set to the positions separated from the press drum and the paper discharge roll.

6. The rotary type stencil printing machine according to claim **5**, further comprising:

a sheet width sensor for detecting a width of the supplied print sheet:

wherein the pinch roller pairs are two sets of pinch roller pairs for pressing two edge portions of the print sheet in a width direction to the press drum;

wherein the pinch roller position adjusting means comprising:

a pair of moving members made movable in the width direction of the print sheet and respectively attached with the two sets of pinch roller pairs;

moving means for moving the pair of moving members in directions reverse to each other; and

a movement detecting sensor for detecting positions of the moving members;

wherein the pinch roller releasing means comprising:

driving means for setting the pinch roller pairs to the release positions or the pinch positions;

cams driven to rotate by the driving means;

an operating member provided to be brought into contact with the cams, slidably moved by pivoting of the cams and provided with the pair of moving members via the moving means; and

a release detecting sensor for detecting whether the pinch roller pairs are brought into a release state; and

wherein the controlling means sets the pinch roller pairs to the release positions by operating the driving means of the pinch roller releasing means after finishing a printing operation and controls the pinch roller position adjusting means in accordance with a signal from the sheet width sensor before carrying out the printing operation.

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